BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 06B

2003 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

July 2003

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South Carolina Department of Health and Environmental Control

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2003 ANNUAL UPDATE

[Data Thru December 2002]

Shellfish Management Area 06B
Shellfish Sanitation Program

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Data Inclusive Dates:
01 / 01 / 00 thru 12 / 31 / 02

Classification Change:
___ Yes __X__ No

Shoreline Survey Completed: YES

Prior Report & Date: Annual -2002

(I)ncreased/(D)ecreased/(N)one:
__N__ Approved
__N__ Cond. Approved
__N__ Restricted
__N__ Prohibited

SUMMARY

There is virtually no upland development within area 06B. The majority of the Area 06B Management Area is located within the confines of the Cape Romain National Wildlife Refuge. Extensive wildlife and waterfowl populations within the management area likely contribute significantly to shellfish growing waters fecal coliform concentrations. An additional contributor to adverse water quality within Area 06B appears to be related to the Santee Rediversion Project. The project rediverted substantial amounts of fresh water into the South Santee River, which partially defines the management area's northern boundary. There appears to be a positive correlation between river flow and fecal coliform concentration.

The fecal coliform geometric mean and/or estimated 90th percentile values for station data within Area 06B indicate a slight statistical improvement in water quality at 16 of the 21 classified stations. During 2000, Santee-Cooper released 4% less water than they did in 1999. During 2001, Santee-Cooper released 28% less average daily flow into the Santee River system compared to 2000. However the 2002 average daily flow was increased above 2001 levels by 92%.

It should be noted that the State is in its fourth year of a mild to moderate drought. The lack of rainfall appears to have resulted in lower shellfish growing water fecal coliform concentrations due to a reduction of overland stormwater runoff. This statistical improvement in water quality may be temporary and the potential exists for the reoccurrence of a downward oscillation.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47 which provides the rules used to implement this authority and outlines the requirements applied in regulating

shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The National Shellfish Sanitation Program (NSSP) Guide For The Control Of Molluscan Shellfish is used by the United States Food and Drug Administration (USFDA) to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as Conditionally Approved. Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision.

For Restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plan for each Conditionally Restricted area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems and an evaluation of each source of pollution) and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvesting classification of shellfish growing waters designated as Shellfish Management Area 06B (Area 06B). Area 06B consists of approximately 15,223 acres of shellfish growing area habitat located in Charleston County, South Carolina. Area 06B consists of the waters of Cape Romain Harbor, the Atlantic Intracoastal Waterway (AIWW), portions of Muddy Bay, and Alligator, Casino, Clubhouse, Congaree Boat, DuPre, Horsehead, Mill, Ramhorn and Skrine Creeks. The northern boundary of the area is the South Santee River, while US Highway 17 defines the western border. The area is bounded to the south by an imaginary line extending from AIWW Marker #32 southeastward to Cape Island and the southern portion of Cape Romain Harbor. The eastern boundary is the Atlantic Ocean.

The harvesting classifications of Area 06B prior to this sanitary survey were as follows:

Prohibited: None

Restricted:

1. The Atlantic Intracoastal Waterway, including adjacent marshlands, from its confluence with the South Santee River to the Area 07 boundary;
2. All portions of Area 06B north of a line extending west/northwest from the marshlands east of Station 06B-21 to Station 06B-19, continuing west/southwest to Station 06B-20, then continuing southwest to the Area 07 boundary.

Approved: All other waters in Area 06B.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, culture permits, and Kings Grant areas. The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina. It is primarily gathered on a small scale by the general public for recreational harvest. The South Carolina Department of Health and Environmental Control will disallow the harvesting of shellfish within Area 06B, for direct marketing purposes, from the restricted waters listed below in the Recommendations.

There is one State shellfish ground within Area 06B, however it is located in the restricted portions of south Alligator Creek. There is one Kings Grant and multiple culture permit lease areas. The Kings Grant and one of the leases fall within both approved and restricted waters; and the remaining five lease areas, or at least portions thereof, fall within approved waters in this area.

The shellfish harvesting season in South Carolina normally extends from mid-September through mid-May. The SCDNR has the authority to alter the shellfish harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish

harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

CHANGES IN POLLUTION SOURCES

One substantial change in pollution sources has occurred in Area 06B since the 2002 report, through an increase in water released by Santee Cooper in 2002. In 2000, Santee Cooper released water with an average daily flow of 3,548 cfs. In 2001, the water released had an average daily flow rate of 2,547 cfs. This represents a 28% decrease from the previous year. In 2002, the water released had an average daily flow of 4900 cfs. This represents a 92% increase over the 2001 average daily flow rate.

SURVEY PROCEDURES

Shoreline surveys of Area 06B were conducted by the Trident and Waccamaw District Shellfish Sanitation staff, by watercraft, vehicle and on foot, during the survey period and are ongoing. Extensive visual examinations of lands adjacent to the waters of Area 06B were conducted to determine potential sources of pollution entering shellfish growing waters.

POINT SOURCE POLLUTION

A. **Municipal and Community Waste Treatment Facilities** - The sole domestic wastewater treatment facility within close proximity to waters suitable for the direct harvest or relaying of shellfish is the Lincoln High School facility in McClellanville, South Carolina. This facility discharges its treated effluent into Shingle Canal, which discharges into Jeremy Creek in Area 07. This National Pollutant Discharge Elimination System (NPDES) site, SC0033618, is indicated on the attached map of Potential Pollution Sources.

B. **Industrial Waste (Discharges)** - There are no industrial wastewater discharges located within the boundaries of Area 06B. However, Santee Cooper's Spillway Hydro at Wilson's Landing and the St. Stephens Hydro near St. Stephens, produce power and regulate freshwater flow into the Santee River system. In order to prevent flooding during periods of high flow into Lake Marion, freshwater is discharged from the Lake Marion Spillway to the Santee River. The vast amount of fresh water released into the Santee River during high flow periods likely impacts water quality within Area 06B. Table 5 indicates total water released by Santee Cooper.

C. **Marinas** - S.C. Regulation 61-47, Shellfish defines *Marina* as "any water area with a structure (docks, basin, floating docks, etc.) which is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space." There are no marinas or commercial boat docking facilities located within Area 06B. Multiple commercial boat docking facilities are

located in Jeremy Creek in adjacent Area 07. Sample data suggests that this creek poses minimal impact to Area 06B.

D. **Radionuclides** - Sources of radionuclides have not been identified within Area 06B, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

A. **Urban and Suburban Stormwater Runoff** - Nonpoint source pollution is the likely major contributing factor to lower water quality in Area 06B. There is little urban development within Area 06B. There have been no stormwater permits issued within this area. The Army Corps of Engineers did not conduct any dredging projects during 2002 in Area 06B. Stormwater runoff impacts water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

The uplands surrounding the shellfish growing waters of Area 06B consist of various soil textures. These have been defined by the United States Department of Agriculture (USDA), Soil Conservation Service (1971) utilizing general classifications and descriptions. Although lands within Area 06B consist of numerous soil types, the area is generally comprised of Seewee-Rutlege soils, nearly level and gently sloping woodland and cropland loamy fine sand. The USDA (1971) further describes these soils as "somewhat poorly drained to moderately well drained, nearly level, sandy soils on ridges and poorly drained to very poorly drained, sandy soils in depressions."

B. **Agricultural Runoff** - There are no permitted agricultural facilities located in Area 06B. The lack of concentrated agricultural activity near the shoreline of the growing waters precludes contamination of shellfish waters from agricultural runoff.

C. **Individual Sewage Treatment and Disposal Systems** - There has been no documentation of new residential construction adjacent to shellfish growing waters in this area. Existing homes utilize individual sewage treatment disposal (ISTD) systems. Each system is required to be inspected by the Division of Environmental Health, Trident Health District, and approved before final installation.

D. **Wildlife and Domestic Animals** - Area 06B supports substantial populations of both wildlife and domestic animals. The lands throughout the area help comprise the Cape Romain National Wildlife Refuge. The refuge contains such wildlife as beaver, rabbit, white-tailed deer, raccoon, opossum, alligators, various rodents and a substantial bird population typical of the coastal Carolinas. The tidal uplands in the refuge have small creeks and drainage ditches throughout the area. This creek system becomes a conduit for animal fecal coliform bacteria to be transported to the adjacent shellfish growing waters.
The Santee Coastal Reserve Management Area operates multiple impoundments that are used by migratory waterfowl. The impoundments have set spillways that overflow at times of heavy

rains to maintain a consistent level in the impoundment. The impoundments are located primarily between the South Santee River and south Alligator Creek, draining into the AIWW.

E. **Boat Traffic** - Recreational boat traffic is moderate throughout the area except during the winter months. Commercial traffic in the AIWW consists primarily of tugs and barges. Commercial fisheries boats, ranging in size from 16 to 50 feet, will operate in the area as long as product demand exists.

F. **Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require periodic maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites.

G. **Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 06B. The Department participates in a State Task Force on Toxic Algae and maintains a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 06B is comprised of salt and brackish marsh and includes shallow bays and meandering creeks protected by a series of offshore barrier islands. The creeks within the area range from 50 to 600 feet in width and average 3 to 9 feet in depth. Additionally, the AIWW traverses the area's entire length in a north-south direction. The AIWW is maintained at a mean low water depth of 12 feet by the US Army Corps of Engineers. The AIWW is the major conduit of low salinity water into Area 06B from the South Santee River. Cape Romain Harbor, a shallow water bay, is the major conduit of high salinity ocean water into the area. The entire system is approximately eight miles wide (northwest to southeast) and eight miles long (southwest to northeast).

Tides - Tides in Area 06B are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in Casino Creek are 4.6 feet during normal tides and 5.3 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Rainfall - Precipitation in Area 06B is heaviest during late summer and early autumn. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. During winter months heavy rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low pressure systems generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns may be dynamic with associated thunderstorms and severe weather conditions.

The yearly rainfall average for the thirty-year period 1973-2002 for Charleston, recorded at the

Charleston Airport, is 50.74 inches. The 2002 precipitation total recorded in McClellanville, approximately 35 miles northeast of Charleston, was 62.06 inches. The four months, July through October, had a total of 28.91 inches of rain. This was 47% of the total rainfall recorded for the year.

Winds - Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

River Discharges - The South Santee River is the major source of freshwater inflow into Area 06B. Flow from the Lake Marion spillway, St. Stephens hydroelectric generating station, and Lake Marion hydroelectric generating station, which discharge into the Santee River, reaches the lower Santee Rivers and surrounding waters of Area 06B approximately 48 hours from the time of release.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 06B in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated shellfish water quality data scheduling and collection procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station, yet provides a six-sample 'cushion' (above the NSSP required 30 minimum) for broken sample bottles, lab error, breakdowns, etc. This also allows each annual report's water quality data to meet the requirements for the NSSP Triennial Review sampling criteria.

Seven hundred and fifty six routine and ten special surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses from 21 active water quality sampling stations in Area 06B during the period 01/01/00 through 12/31/02. The samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control's Trident District Environmental Quality Control laboratory at North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. At the laboratory, sample sets exceeding a 30-hour holding time or containing a temperature control in excess of 10 degrees C. were discarded (APHA, 1970).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using an automatic temperature compensated refractometer. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages were determined by using Nautical Software's *Tides & Currents*, Version 2 (1996).

MONITORING RESULTS

Stations 7 and 13 exceeded a fecal coliform geometric mean MPN value of 14. No station exceeded a fecal coliform geometric mean MPN value of 88. Stations exceeding a fecal coliform MPN estimated 90th percentile value of 43 were 7, 8, 9, and 13. No station exceeded an estimated 90th percentile fecal coliform MPN value of 260.

CONCLUSIONS

Based on the review of fecal coliform bacteriological data and the pollution source survey, Area 06B is impacted by two sources of actual or potential pollution.

NONPOINT SOURCE RUNOFF

Stormwater runoff continues to be a major source of fecal coliform bacteria contamination in the area. Area 06B lies within the boundaries of the Cape Romain Wildlife Refuge. The refuge provides suitable habit for abundant wildlife populations. The dredge spoil areas used by the Army Corps of Engineers and the surface water impoundments utilized by the Santee Coastal Reserve, along with numerous small tidal islands and the vast network of meandering creeks provide prime habitat for regional wildlife and migratory waterfowl.

FRESHWATER INFLOW

Area 06B receives substantial freshwater inflow via the South Santee River. This is primarily due to the added water released by Santee-Cooper as part of the rediversion project. The greatest amount of water is typically released between the months of December and May. Salinity at Station 13 data has been measured at 0 ppt in two of the past thirty-six samples and <10 ppt in eight other instances during the past 36 months. Analytical results have suggested a direct relationship between lower salinity and elevated fecal coliform bacteria concentrations. Station 10, although currently meeting criteria for an approved classification, will remain Restricted due to an elevated 90^{th} percentile MPN value during drought conditions, as well as it's proximity to Station 09. A downward oscillation in water quality at Station 10 is likely upon return to normal rainfall patterns.

RECOMMENDATIONS

The shoreline survey and the bacteriological data review of shellfish growing Area 06B indicate that the current classification boundaries are appropriate. The harvesting classification of Area 06B for this sanitary survey will be as follows:

Prohibited: None

Restricted:

1. The Atlantic Intracoastal Waterway, including adjacent marshlands, from its confluence with the South Santee River to the Area 07 boundary;
2. All portions of Area 06B north of a line extending west/northwest from the marshlands east of Station 06B-21 to Station 06B-19, continuing west/southwest to Station 06B-20, then continuing southwest to the Area 07 boundary.

Approved: All other waters in Area 06B.

Station Additions/Deactivations/Modifications: None.

Analysis of sampling data for Area 06B demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24 hour period. Therefore, a precautionary closure of Area 06B will be implemented following rainfall events of greater than 4.00" in a 24 hour period, as measured at the Wambaw Ranger District, Francis Marion National Forest, McClellanville. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). PMP estimates for the coastal United States have been published in a series of hydro-meteorological reports (HMRs) by the National Weather Service (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52 and 53 (*National Research Council, 1985*).

REFERENCES

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National Weather Service. The National Oceanic and Atmospheric Administration. *Precipitation Frequency Atlas of the Western US: NOAA Atlas II*. Superintendent of Documents, US Government Printing Office Washington DC.

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TABLE #1

Shellfish Management Area 06B
Water Quality Sampling Stations Description

Station	Description
06	Alligator Creek and Ocean Inlet
07	Alligator Creek at Marker #26
08	Casino Creek at Marker #29
09	DuPre Creek - 500 feet north of new dock (south of Marker #30)
10	AIWW at Marker #32
12	Alligator Creek State Shellfish Ground
13	Alligator Creek nearest South Santee River between Markers 24 & 25
14	Horsehead Creek at confluence with Cape Romain Harbor
15	Casino Creek at Cape Romain Harbor
16	Casino Creek midway between Stations 19 and 24 (at small unnamed creek on right, southbound)
17	Congaree Creek at Tower Creek
18	Confluence of DuPre Creek and Clubhouse Creek
19	Confluence of Casino Creek and Skrine Creek
20	1,000 yards up DuPre Creek from Clubhouse Creek
21	Confluence of Alligator Creek and Ramhorn Creek
22	Confluence of Ramhorn Creek and Mill Creek
23	Confluence of Skrine Creek and Congaree Boat Creek
24	Confluence of Casino Creek and Congaree Boat Creek
25	Confluence of Horsehead Creek and Unnamed Creek at lower end of Horsehead Island
26	Confluence of Skrine Creek and unnamed creek north of Muddy Bay
27	The confluence of the first large creek on the left, with Congaree Boat Creek, traveling southeast of Station 23

(Total 21)

Figure 1.

Shellfish Management Area 06B Prior Classification

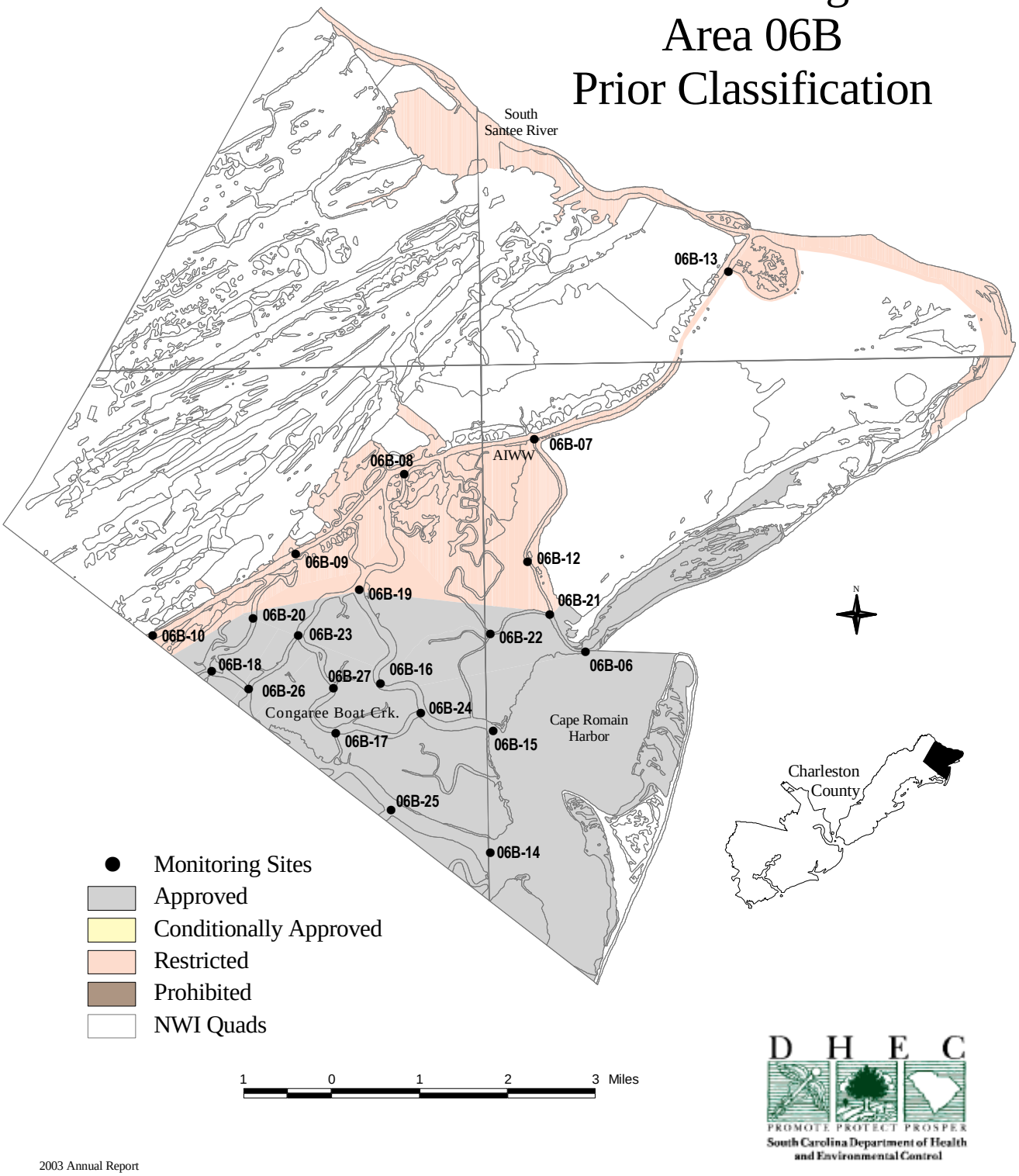

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Figure 2.

Shellfish Management Area 06B Current Classification

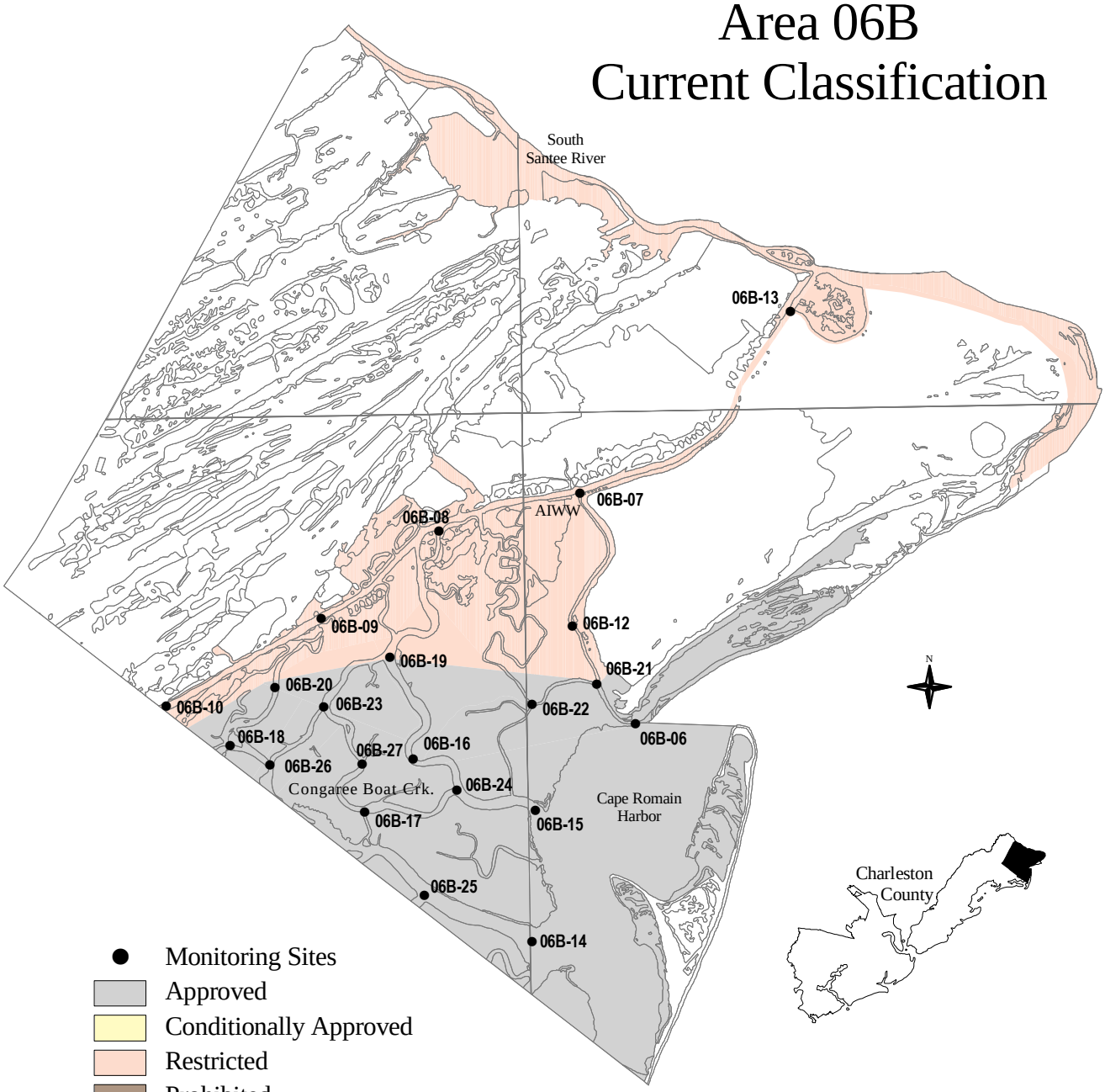

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Figure 3.

Shellfish Management Area 06B

Potential Pollution Sources

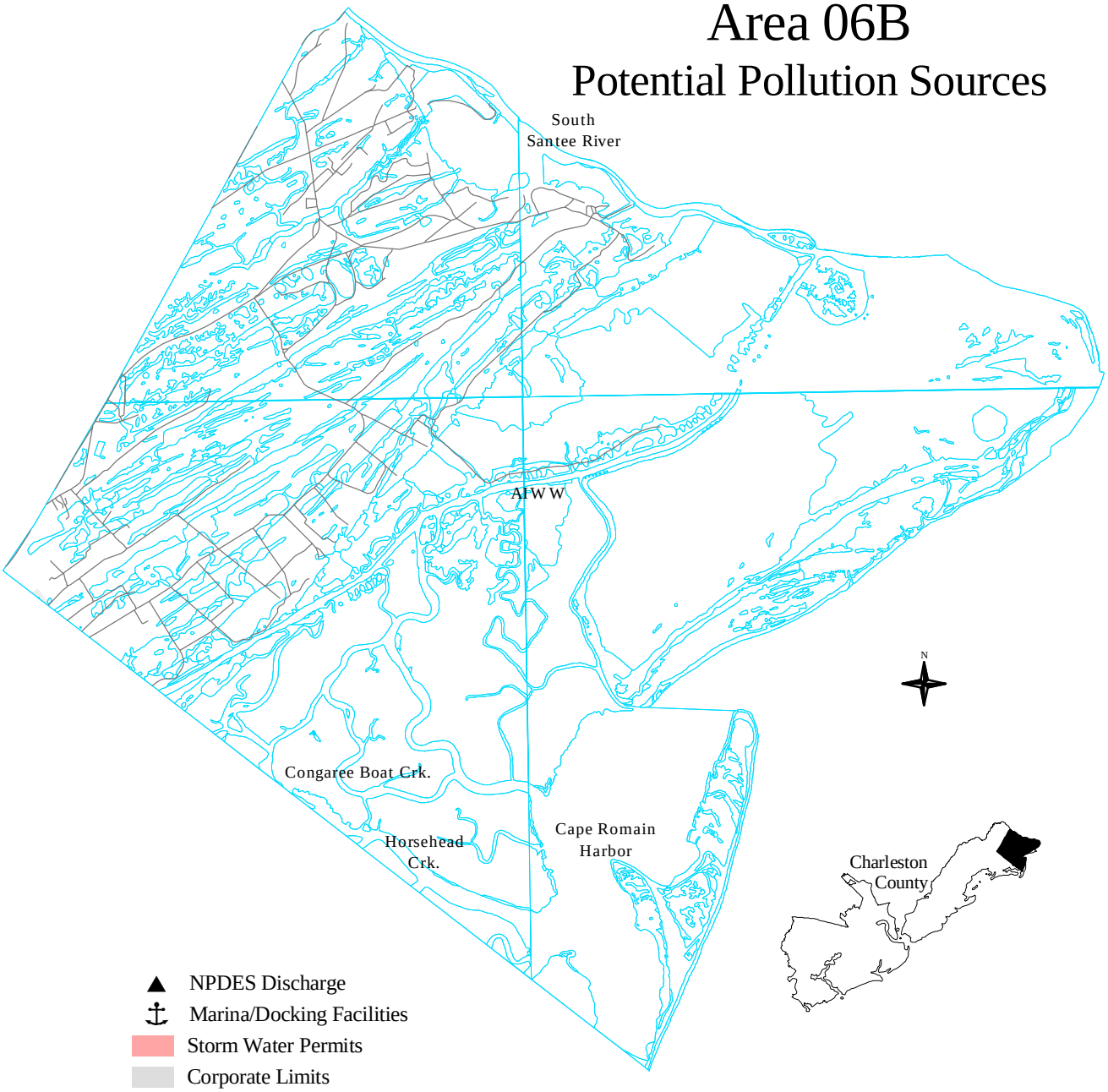

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TABLE #2

Shellfish Management Area 06B
FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations from

January 1, 2000 thru December 31, 2002

Station #	6	7	8	9	10	12	13	14	15	16
Samples	36	36	35	35	36	36	36	36	36	36
GeoMean	4.3	18.6	13.0	10.4	6.8	5.8	44.9	2.1	2.7	3.9
90th %ile	22	89	88	67	37	29	233	4	4	14
Water Qlty	A	R	R	R	A	A	R	A	A	A
Classification	A	R	R	R	R	R	R	A	A	A

Station #	17	18	19	20	21	22	23	24	25	26
Samples	36	36	36	36	36	36	36	36	36	36
GeoMean	2.3	5.0	7.0	4.2	4.7	4.3	3.9	2.6	2.0	2.9
90th %ile	4	30	30	18	23	14	14	5	2	8
Water Qlty	A	A	A	A	A	A	A	A	A	A
Classification	A	A	R	R	A	R	A	A	A	A

Station #	27									
Samples	36									
GeoMean	3.0									
90th %ile	7									
Water Qlty	A									
Classification	A									

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

TABLE #3

Water Quality
Sampling Stations Data

Shellfish Management Area 06B

BACTERIOLOGICAL DATA

Data for each shellfish station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained through South Carolina's Department of Health and Environmental Control - Freedom of Information office at the address below.

Freedom of Information
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

TABLE #4

Rainfall Data

Shellfish Management Area 6B

SOURCE:
Rainfall information provided by
Wambaw Ranger District
Francis Marion National Forest, McClellanville, SC

ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: Wambaw Ranger District

Francis Marion National Forrest, McClellanville, SC

2000	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.34	0.00	0.00	0.00
3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	1.52	0.00	0.00	0.14
4th	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.82	0.85	0.00	0.00	0.00
5th	0.17	0.00	0.01	0.00	0.00	0.14	0.00	0.64	5.49	0.00	0.00	0.00
6th	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.00	0.84	0.00	0.00	0.00
7th	0.32	0.00	0.00	0.00	0.00	0.00	2.60	0.00	0.00	0.00	0.00	0.00
8th	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
9th	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10th	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.67
11th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00
12th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.52	0.00	0.00	0.00	0.05
13th	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00
14th	0.00	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
15th	0.00	0.05	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16th	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23
17th	0.00	0.00	0.32	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.12	0.15
18th	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.61	0.00	0.00	0.00
19th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.00	0.70	0.00
20th	0.20	0.00	1.55	0.00	0.00	0.11	0.00	0.00	0.00	0.00	1.08	0.09
21st	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.07	0.00	0.00	0.00
22nd	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.23	0.00	0.00	0.00
23rd	0.13	0.00	0.00	0.00	0.00	0.00	2.01	0.62	0.85	0.00	0.00	0.00
24th	0.60	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.20	0.00	0.00	0.00
25th	0.69	0.00	0.00	0.31	0.00	0.57	0.42	0.00	0.00	0.00	0.00	0.00
26th	0.00	0.00	0.00	0.00	1.34	0.08	0.03	0.00	0.00	0.00	2.12	0.00
27th	0.00	0.06	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28th	0.00	0.00	0.30	0.21	0.00	0.01	0.00	0.44	0.00	0.00	0.00	0.14
29th	0.00	0.00	0.00	0.00	0.46	0.28	2.57	1.03	0.00	0.00	0.00	0.79
30th	0.00		0.00	0.36	0.00	3.41	1.18	0.00	0.20	0.00	0.00	0.00
31st	0.80		0.00		0.00		0.22	0.00		0.00		0.00

(Monthly Figures) **Year's Rainfall Total: 62.01**

TOTAL	3.33	1.60	3.24	1.84	1.80	5.78	9.97	7.87	19.22	0.00	4.04	3.32
MAX	0.80	1.46	1.55	0.64	1.34	3.41	2.60	3.52	8.61	0.00	2.12	1.67
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.11	0.06	0.10	0.06	0.06	0.19	0.32	0.25	0.64	0.00	0.13	0.11

(Shellfish Management Areas 06A, 06B, and 07.)

ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: Wambaw Ranger District

Francis Marion National Forrest, McClellanville, SC

2001	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.67	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.00	0.14	0.01	0.13	0.00	0.00	0.61	0.00
3rd	0.00	0.00	1.00	0.00	0.00	0.00	1.13	0.20	0.17	0.00	0.01	0.00
4th	0.00	0.00	0.01	0.04	0.00	0.07	0.29	0.00	0.35	0.00	0.00	0.00
5th	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.05	0.00	0.00
8th	0.31	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00
9th	0.00	0.00	0.00	0.00	0.00	0.12	0.08	0.00	0.03	0.00	0.00	0.05
10th	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.21	0.00	0.00	0.00
11th	0.00	0.00	0.00	0.00	0.17	0.78	0.00	0.00	0.23	0.00	0.00	1.86
12th	0.30	0.51	0.72	0.00	0.00	1.51	1.86	0.00	0.20	0.00	0.00	0.00
13th	0.15	0.02	0.00	0.00	0.81	0.01	0.44	0.00	0.00	0.00	0.00	0.02
14th	0.00	0.01	0.00	0.00	0.00	0.40	0.19	1.22	0.11	0.03	0.00	0.19
15th	0.05	0.00	1.93	0.06	0.00	0.01	0.00	1.21	0.00	0.87	0.00	0.00
16th	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.03	0.00
17th	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
19th	0.00	0.00	0.00	0.00	0.00	0.32	0.04	0.18	0.00	0.00	0.01	0.00
20th	0.04	0.00	1.77	0.00	0.00	0.01	0.03	0.26	0.00	0.00	0.01	0.00
21st	0.00	0.00	0.62	0.00	0.00	0.10	0.21	0.07	0.00	0.00	0.00	0.00
22nd	0.00	1.04	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00
23rd	0.00	0.00	0.00	0.00	0.92	0.00	0.15	0.00	0.00	0.00	0.00	0.04
24th	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.93	0.00
25th	0.00	0.00	0.27	0.44	0.00	0.91	0.00	1.02	0.43	0.00	0.26	0.00
26th	0.00	0.01	0.00	0.08	1.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00
27th	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00
28th	0.00	0.08	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00
29th	0.00		0.60	0.00	0.58	0.00	0.28	0.00	0.00	0.00	0.00	0.00
30th	0.08		0.05	0.00	0.06	0.00	0.18	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.00				0.00	0.00		0.00		0.00

(Monthly Figures) **Year's Rainfall Total: 37.54**

TOTAL	0.97	2.01	6.97	0.62	3.56	4.88	6.47	4.57	2.40	0.95	1.86	2.28
MAX	0.31	1.04	1.93	0.44	1.02	1.51	1.86	1.22	0.67	0.87	0.93	1.86
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.03	0.07	0.22	0.02	0.12	0.16	0.21	0.15	0.08	0.03	0.06	0.07

(Shellfish Management Areas 06A, 06B, and 07.)

ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: Wambaw Ranger District

Francis Marion National Forrest, McClellanville, SC

2002	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.67	0.06	0.00	0.00	0.00	0.49	0.03	0.00	0.00
2nd	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.00
3rd	0.31	0.00	1.20	0.00	0.59	0.00	0.00	0.45	0.20	0.00	0.00	0.00
4th	0.05	0.00	0.05	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.19	0.00
5th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.01	0.19
6th	0.58	0.06	0.00	0.00	0.00	0.00	0.13	0.01	0.04	0.00	1.32	0.01
7th	0.01	1.60	0.00	0.00	0.00	0.00	0.54	0.03	0.00	0.00	0.00	1.32
8th	0.00	0.09	0.00	0.00	0.00	1.04	0.00	0.00	0.00	0.39	0.00	0.00
9th	0.00	0.00	0.06	0.00	0.00	0.00	0.48	0.00	0.00	0.08	0.00	0.00
10th	0.00	0.44	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.07	0.48	1.24
11th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.78	0.01	0.08
12th	0.00	0.00	0.02	0.28	0.00	0.00	2.07	0.00	0.00	0.00	1.12	0.00
13th	0.87	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.78
14th	0.00	0.00	0.00	0.15	0.28	0.00	0.31	0.00	0.02	1.64	0.00	0.07
15th	0.65	0.00	0.00	0.00	0.00	0.87	0.00	0.00	0.21	1.48	0.00	0.00
16th	0.00	0.06	0.00	0.00	0.00	0.00	1.70	0.00	1.72	0.02	0.06	0.00
17th	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.65	0.00
18th	0.00	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.06	0.00	0.17	0.00
19th	0.00	0.00	0.00	0.00	1.41	0.09	0.00	0.00	0.00	0.00	0.00	0.65
20th	0.05	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.13
21st	0.00	0.20	0.47	0.00	0.00	2.60	0.00	0.05	0.00	0.00	0.00	0.00
22nd	0.04	0.00	0.00	0.00	0.00	1.61	0.00	0.00	0.00	0.22	0.00	0.00
23rd	0.00	0.05	0.00	0.00	0.00	1.26	0.93	0.00	0.00	0.00	0.00	0.00
24th	0.00	0.01	0.00	0.00	0.00	0.04	0.33	0.00	1.09	0.08	0.00	0.44
25th	0.12	0.00	0.00	0.54	0.00	0.00	0.00	0.09	0.04	0.01	0.00	0.89
26th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	2.34	0.00	0.00	0.00
27th	0.00	0.00	0.44	0.27	0.00	0.00	0.14	1.58	0.00	0.00	0.00	0.00
28th	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00	0.00	0.00
29th	0.00		0.00	0.00	0.00	0.35	0.00	2.09	0.00	0.09	0.00	0.00
30th	0.00		0.00	0.00	0.05	0.00	0.00	2.36	0.00	0.18	0.00	0.00
31st	0.00		0.00		0.00		0.00	0.23		0.00		0.00

(Monthly Figures) **Year's Rainfall Total: 63.38**

TOTAL	2.69	2.51	3.79	2.92	2.99	9.11	6.65	9.16	7.03	6.07	4.66	5.80
MAX	0.87	1.60	1.20	1.01	1.41	2.60	2.07	2.36	2.34	1.78	1.32	1.32
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.09	0.09	0.12	0.10	0.10	0.30	0.21	0.30	0.23	0.20	0.16	0.19

(Shellfish Management Areas 06A, 06B, and 07.)

Table #5

Santee Cooper
Water Diversion Data

Shellfish Management Area 6B

TABLE #5
Shellfish Management Area 06B
Average Daily Rate of Total Water Released By Santee Cooper Into The Santee River

Amounts shown are per day, not cumulative

Sample Date	24 Hours Prior	48 Hours Prior	72 Hours Prior	96 Hours Prior	120 Hours Prior
12/16/02	16,879.92	16,969	15,214.04	14,179.96	12,149.13
11/25/02	8,588.71	8,278	8,047	8,194.13	6,046.33
10/16/02	566.13	557.33	540.25	548	516
09/11/02	561.13	585.96	580.96	600	600
08/19/02	608.04	600	592	584.08	657.75
07/17/02	1,012.59	587.54	595.42	600	600
06/19/02	592.58	1,909.88	588.21	596.63	584.46
05/20/02	633.21	616.79	1,791.38	1,468.71	1,031.04
04/02/02	600	601.21	603.08	603.21	602.46
03/20/02	667.17	1,202.04	582.75	584	600
02/11/02	600	600	600	600	507
01/28/02	600	875.90	600	600	600
12/03/01	600	600	600	600	600
11/27/01	600	600	600	600	600
10/15/01	600	600	600	600	1,262
09/24/01	600	600	747	600	600
08/08/01	1,060	600	600	600	1,940
07/17/01	600	600	600	600	727
06/12/01	600	600	600	600	600
05/23/01	600	818	600	600	635
04/18/01	2,562	2,008	2,071	3,632	3,607
03/14/01	600	600	600	600	600
02/06/01	600	600	723	600	600
01/08/01	600	600	600	1,627	1,366
12/06/00	1,406	830	600	600	600
11/13/00	600	600	600	600	600
10/10/00	600	600	600	600	600
09/25/00	600	600	600	600	600
08/21/00	600	600	600	600	600
07/19/00	1,816	600	600	600	600
06/26/00	600	600	600	600	600
05/08/00	2,509	1,828	989	2,462	3,006
04/18/00	15,345	8,307	8,423	13,287	8,931
03/28/00	17,972	17,007	16,963	17,167	17,244
02/14/00	6,121	6,640	3,574	2,765	3,742

01/19/00	7,117	1,583	4,926	14,101	8,898

All Daily Averages Shown as Cubic Feet per Second (CFS) / Figures derived from Santee Cooper data.